The Journal of Electricity, Power and Gas

WITH WHICH IS INCORPORATED

The Engineers' Architects' and Builders' News

VOLUME XVI SAN FRANCISCO, CAL., JUNE 23, 1906 No. 12

A Modern Power Plant of an Electric Railway in Portugal.

BY FKANK C. PERKINS.

A new electric railway has recently been placed in operation from the city of Cintra, near Lisbon, Portugal, to Praia das Macas, these two towns being located in the midst of a rich agricultural district, and it was found desirable that some more rapid means of transportation was essential in order to develop these resources, bringing the various country products into the larger cities. It may be stated that these two towns are of considerable importance in a way, the former being well known as a resort in summer, while the latter, being situated thirteen kilometers away in the mountain which bears its name, is the summer residence of the King of Portugal. Consequently the Court and thousands of people seek this place during the summer, finding it an agreeable change from the intense heat which prevails in Lisbon.

The accompanying illustration, Fig. 1, shows one of the cars utilized on this line, of the open type, while

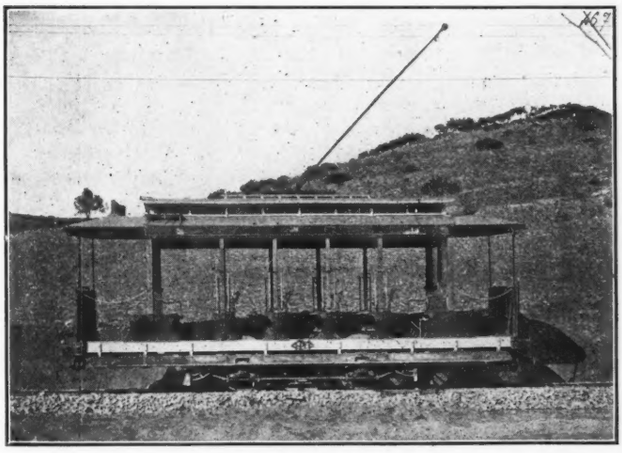


Fig. 1. Open Car showing Magnetic Rail Brakes as used in Portugal.

Fig. 2 shows one of the short closed cars on the Cintra ao Oceano line. There are seven motor cars and six trailers in the equipment, four of which are open, carrying 32 passengers, the remainder being of the closed type and carrying seventeen passengers. These cars were constructed by J. B. Brill & Co., of Philadelphia, and there are also six freight cars utilized on the line. Each motor car has two Westinghouse motors of 20 horsepower capacity, with two forms of braking devices, one of which is the magnetic railbrake. Two shoes are arranged to come in contact with the rail by magnetic attraction at the moment the brake is to be applied, each shoe forming an electro magnet, excited by the current produced by the motors, acting as generators, and the brake shoes acting against the wheels, in addition to those in contact with the rails, operate with great power. It is stated that the applica-

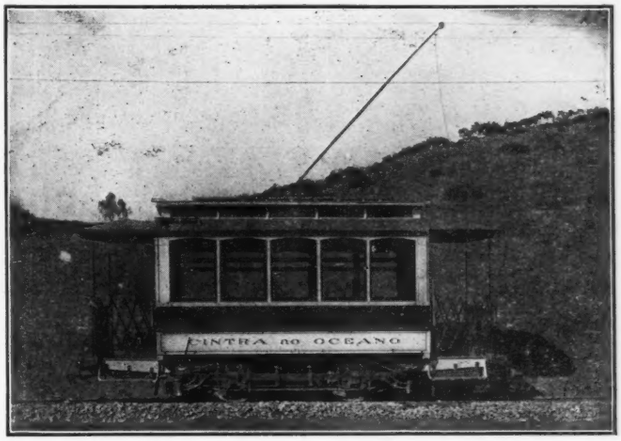


Fig. 2. Closed Car on Portugal "Cintra ao Oceano" Electric Railway.

tion of the shoes on the rails also transfers by levers a lateral pressure on the wheels.

The accompanying illustrations, Figs. 3, 4, 5 and 6, show the exterior of the power house, the boiler room, engine room and switchboard equipment as installed by the Societe Anonyme Westinghouse du Havre. This railway power house is constructed of masonry and located just outside the city of Cintra, the engine room being 24 meters long and 12 meters wide, and the boiler room 15 meters wide and 24 meters long,

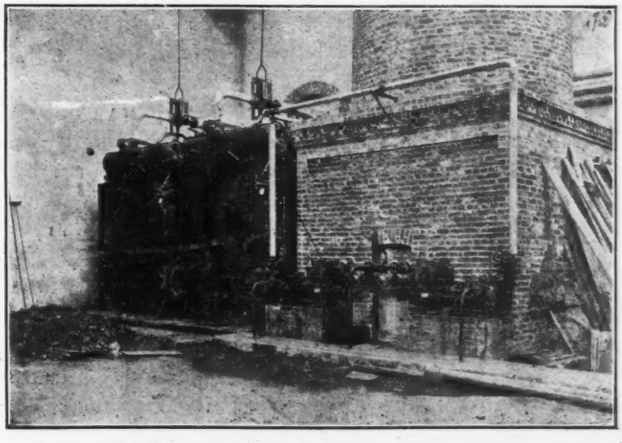


Fig. 4. Boiler Room in Cintra Power House in Portugal.

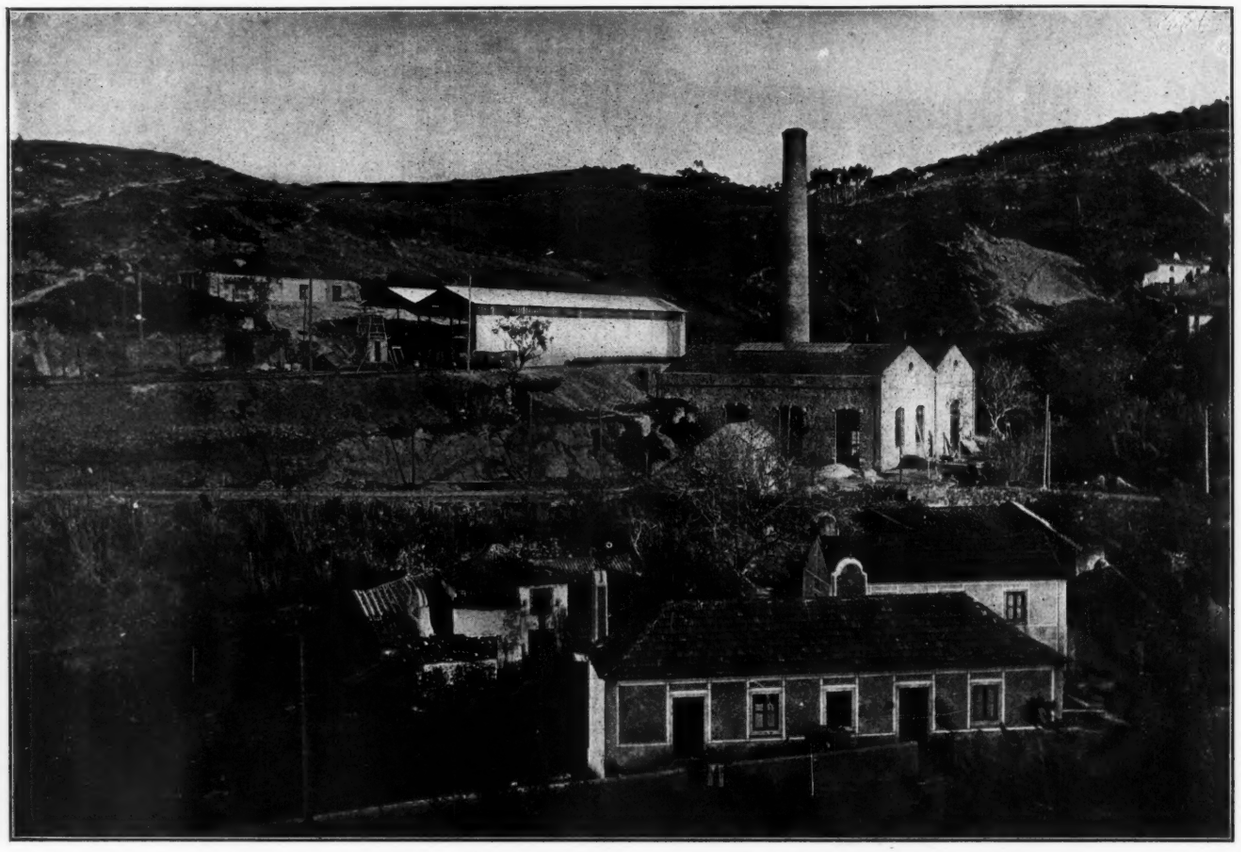


Fig. 3. Electric Power Station of Cintra Railway in Portugal.

the two being separated by a brick wall, the design being such as to obviate as much as possible the use of additional piping, thus reducing the loss in the steam pressure between the boilers and engine.

The boiler room is equipped with two Belleville boilers, each having a heating surface of 150 square meters, operating under a normal steam pressure of 17 kilos. Each boiler produces 3,000 kilos of steam per hour, a reservoir being provided holding 750 cubic meters of water for feeding the boilers, this reservoir being located near the plant, the water being fed through the boilers by Worthington Steam Pumps. There is an abundance of water, as the plant is located near the river Rio de Colleres, the water supply therefore being unlimited. The waste gases from the boilers are carried to a brick chimney 35 meters in height, and the plant is equipped with a large coal storage shed and a complete repair shop.

The engine room is served by an electric over-head traveling train of eight tons capacity, and there are two generating sets installed in this room, consisting of a 450 horsepower Willians compound vertical highspeed engine directly coupled to a Westinghouse compound wound direct current dynamo of 270 kilowatts capacity. These two units produce a continuous current of 550 volts pressure for operating the electric cars, being supplied to the trolley lines at various points by feeders. The accompanying illustration, Fig. 5, shows a lighting unit installed in this power house consisting of a Willians compound highspeed steam engine directly coupled to a Westinghouse alternator of 75 kilowatts capacity, having its exciter mounted on the same shaft as the engine and alterntor outside of the main bearings. This electrical generator is utilized for supplying current for the lighting service of the city, both public and private, the current used being single phase of 2,200 volts pressure. Seven transformers have been installed at convenient points throughout the city to reduce the pressure from 2,200 volts to 105 volts for incandescent lighting.

The engine room also contains a feeder booster-set and a five panel switchborad, as shown in illustration, Fig. 6, constructed of white marble, two panels being

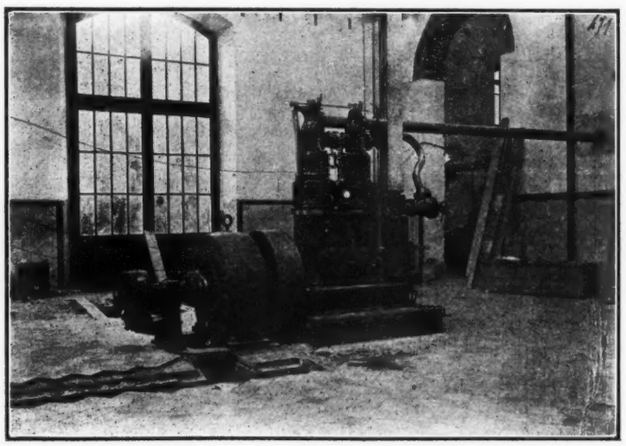


Fig. 5. Lighting Generator in Cintra Electric Railway Power Station.

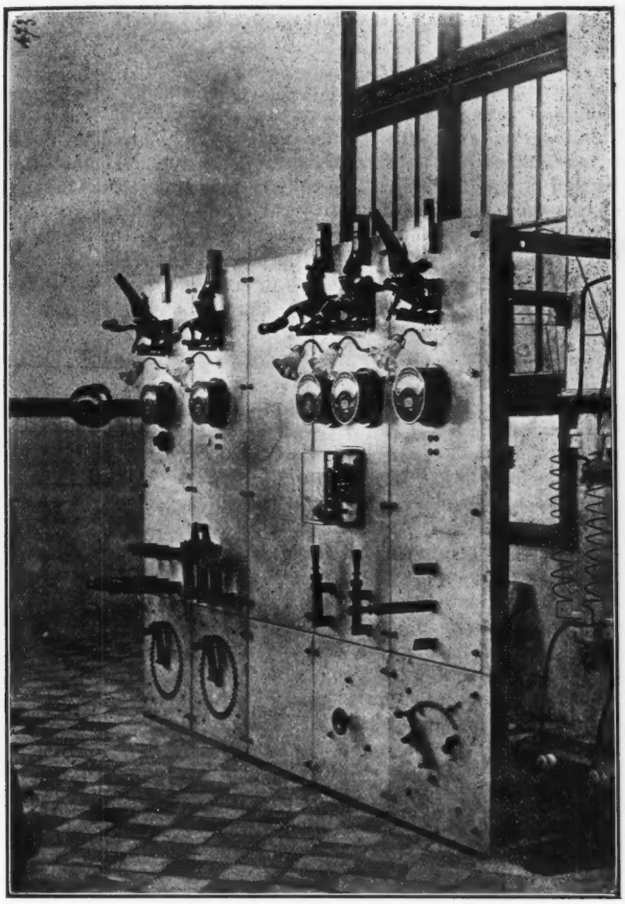


Fig. 6. Switchboard at Cintra Power Station in Portugal.

utilized for the generator service, and two for the feeder, while the remaining panel is not being utilized at present but is held in reserve for a probable future increase in the capacity of the station. While this station is not large, still it is of interest, showing the power station, equipment, the track construction and rolling stock of the electric railways in Portugal.

NEW STREET LIGHT

Something new in electrical illumination is being displayed at 1455 Fillmore street, San Francisco. Two large arc lights of German manufacture, known as the Siemens and Nuremburg flaming arc lamps, suspended over the entrance to the store, raidiate a soft mellow light, of powerful illuminating strength. The lamps are the latest invention in the illumination branch of electricity. They are creating wide spread interest for they cast a light which makes a large portion of the block seem as if it were lighted with the rays of the sun.

The lamps have carbons differently arranged from those of the ordinary arc lamp. Instead of meeting end to end, the carbon poles project from the same end of the lamp and slant toward each other, remaining some distance apart. The flaming arc is greater than that af the ordinary arc light, and remarkably steady, strong light is the result.

The carbon is a new chemical mixture, which can be altered so as to produce the cardinal colors. Tne lamps give a twelve times greater light than the ordinary arc, with the same amount of power. They have been brought here from Germany by the Electrical firm of Cannon & Wolfe. They are now used extensively in street and building lighting in the largest cities of Europe.

STANDARD EQUIPMENT FOR ELECTRICAL PLANTS

Electrical contractors will no doubt be interested, says the "National Electrical Contractor," in knowing what the fire underwriters of the country require, as regards electrical arrangemen s, in the equipment of a standard electric light and power station, and we give below the data which should be of value for future reference: All generators must be located in a dry place; must be insulated on floors or base frames, which must be kept filled to prevent absorbtion of moisture, and also kept clean and dry.

Where frame insulation is impossible the inspector may, in writing, permit its omission, in which case the frame must be permanently and effectively grounded.

Conductors from generators, switchboards, rhoestats or other instruments and thence to outside lines, must be in plain sight and readly accessible; must be wholly on non-cumbustible insulators, such as glass or porcelain, and must be separated from contact with floors, partitions or walls through which they pass by non-combustible insulating tubes. They must be held rigidly so far apart that they cannot come in contact, and must be covered with non-inflammable insulating material sufficient to prevent accidental contact, except that "bus bars" may be made of bare metal. They must have ample carrying capacity to prevent heating, and where leaving the building must be looped downward, the tubes in wihch they are inclosed to be inclined so as to prevent the entrance of rain water along the wires An approved safety fuse or automatic circuit breaker, on a non-combustible base must be provided for each feeder and primary main. All wire connections must be soldered to secure good contact, excepting approved screw contacts. Branch wires for statoin lighting must be installed in accordance with the National Code of Rules for electric light and power wiring.

Switchboards must be so placed as to reduce to a minimum the danger of communicating fire to adjacent combustible material. Special attention is called to the fact that switchboards should not be built down to the floor, nor up to the ceiling, but a space of least eighteen inches or two feet should be left between the floor and the board, and between the ceiling and the board, in order to prevent fire from communicating from the switchboard to the floor or ceiling, and also to prevent the forming of a partially concealed space, very liable to be used for storage of rubbish and oily waste.

The boards must be accessible from all sides when the connections are on the back, or may be placed against a brick or stone wall when the wiring is entirely on the face. They must be kept free from moisture and made of non-combustible material or of hard wood in skeleton form, filled to prevent absorption of moisture. Bus bars must be equipped in accordance with rules for placing conductors.

Resistance boxes and equalizers must be equipped with metal or other non-combustible frames, the word "frames" meaning the entire case and surrounding of rhoestat, and not alone the upholding supports. These boxes and equallizers must be placed on the switchboard or, if not thereon, at a distance of a foot from combusitble material, or separated therefrom by a non-inflammable, non-absorptive insulating material.

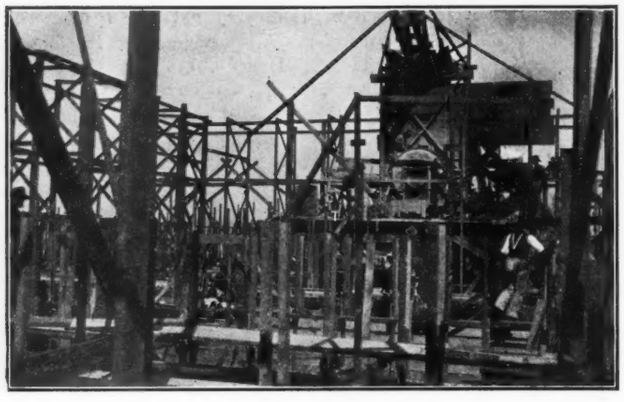
Lightning arresters must be attached to each side of every overhead circuit connected with the station, and must be mounted on non-combustible bases, in plain sight on the switchboard, or in an equally accessible place away from combustible material. They must also be connected with at least two "earths" by separate metallic strips or wires having a conductivity not less than that of No. 6 B. and S. wire. These strips or wires must be run as nearly as possible in a straight line from the arresters to the earth connection. Arresters must be so constructed as not to maintain an arc after the discharge has passed.

In general all apparatus must be maintained in good condition, and, together with all wiring, must conform with rules for safe wiring.

The Reinforced Concrete Bag House of the Selby Smelting and Lead Co.*

By JAMES C. BENNETT

Owing to the uncertain nature of the natural ground beneath the new building, a bearing value of but two thousand six hundred pounds per square inch was decided upon. The footings were reinforced with one-half inch square bars. The new style corrugated bar was used throughout the work. The distance between centers of pilaster is, 16 feet 10 inches for the two end panels and 15 feet the remainder, for the length of the building and 88 feet 1¼ inches for the width. The main walls are 6¾ inches thick for their full height. The cross walls, which were placed between each pair of pilasters, are 7½ inches thick, over their tile facing, and extend up to the "bag floor" which is 14 feet 10 inches above datum. The inside faces of the main walls from



THE MIXING PLANT.

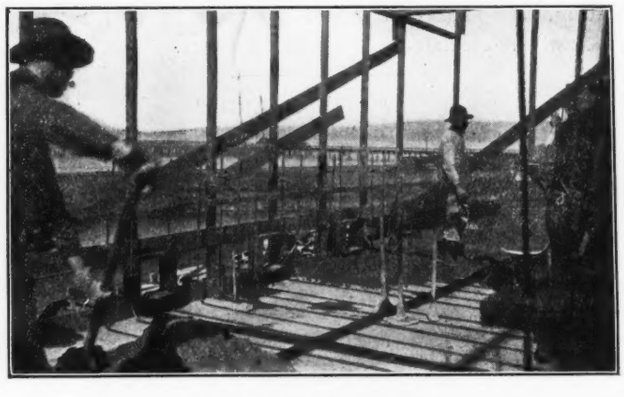
ground to bag floor and both faces of the interior walls are faced with tiles of fire clay, 12 inches square by three-quarter inch thick. The tiles were made especially for this work and are provided with dovetail ribs on the one face, thus affording a simple and very effective lock in the concrete. The tiles are placed in position, a course at a time as the work progresses and are thus made a part of the wall. Tests made during the construction showed that the bond is so strong as to cause the tiles or the concrete to break before the joint would loosen. This tile facing, be it understood, is to afford protection to the concrete from the action of the gases as well as from the heat of the burning dust when it is set afire in the successive chambers which are formed by the transverse walls. Each chamber is entirely separate from all others and may be opened and cleaned at any time without further disturbing the remainder of the building than to throw its duty on the remaining seven-eighths of the filtering area.

The corner pilasters are 18 inches square with two inner faces flush with the inside faces of the main walls, and the intermediate pilasters are of the same size with the one interior face flush. The form work was thus considerably simplified by having one face of the walls perfectly smooth from the ground to the eaves with the exception of a ledge at the level of the underside of the bag floor for the purpose of affording the slab a support around the sides. The walls, between the ground level and the bag floor are considerably cut up by the openings for doors and flue connections, as a door is provided on each end of the chamber (in the side walls) and on one end are two flue openings, an inlet and an outlet. It will thus be seen that the walls could not be considered as lending any support for their upper weight. The walls were taken as dead weight supported by the columns, together with their wind strains, which are considerable in the place where the building is erected. It should have been mentioned that at the corner of the building nearest the shore there were evidences of very recent settling so that it was deemed advisable to provide for still further movement. This was done by excavating to a depth of about twelve inches below the bottom of the pier and filling in with loose gravel. On top of this the concrete was laid directly thus forming a matress which can slide or roll on the gravel below it in the case of any further settling. This bed of gravel was extended out under the end wall for a distance of about ten feet, which distance covered the ground that showed any evidence of recent settling.

The bag floor is of the same thickness as the main walls and lined on its under side with tiles in the same manner as the interior of the walls. Placed in the bag floor at distances of two feet between centers are terra cotta nozzles eighteen inches outside diameter, and projecting six inches above the surface of the concrete. These are for the purpose of connecting the bags or filters with the dust chambers, and are held in place in the concrete by having their surfaces scratched or roughened. It will thus be seen that the strength of the floor slab must be made up of a series of beam sections six inches wide by six and three-quarters inches deep. All reinforcing bars are placed in these sections, both ways, and according to the computations they afford ample strength for any floor loads that can possibly be imposed upon them.

Immediately above the level of the floor there are doors, one to each panel, thus again cutting up the continuity of the walls There are no more openings until a height of 30 feet four inches above the floor is reached, where there is another series of doors for admission to the filter room above the tops of the bags. These openings extend to within ninteen inches of the bottom of the roof, purlin. This space above the upper door is thickened outward to 12¾ inches thus setting off the wall somewhat in appearance and at the same time giving it some additional strength.

The roof trusses are attached directly to the pilsters, the bolts being set as the walls were placed. Connection angles were provided, bolted to the trusses to permit of some adjustment. The trusses are five feet deep at the walls and 8 feet nine inches at the center thus giving the



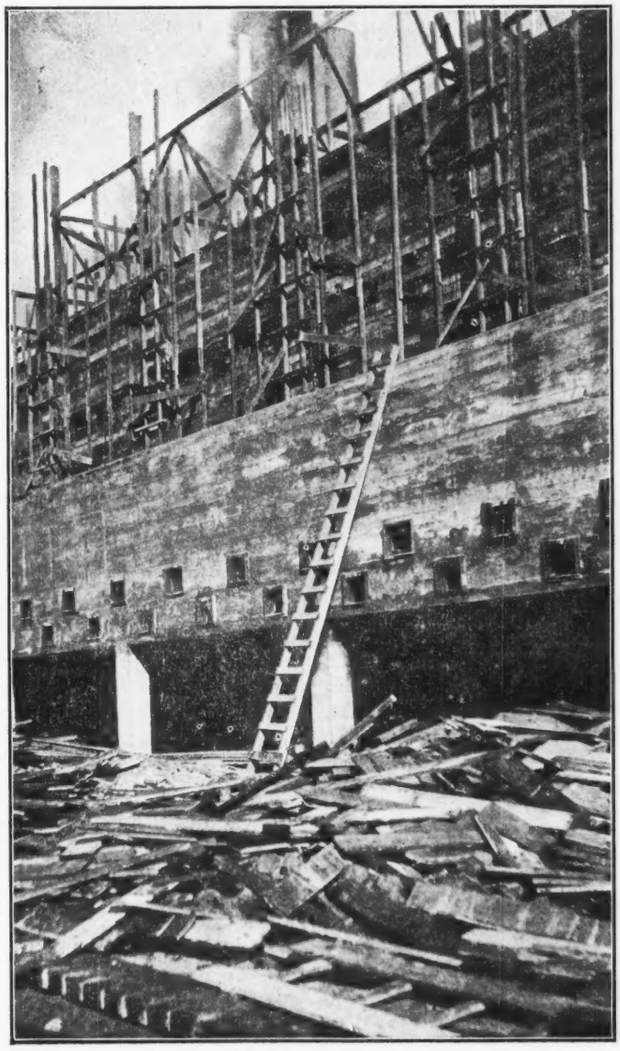
FLOOR OF COMBUSTION FLUE.

roof a pitch of about one inch per foot. The trusses are supported at the center by latticed angle columns which are carried on the bag floor, and are provided for by pilasters in the walls below. The roof is of prepared material laid on one inch sheathing, which was first used for forms. On the prepared roofing is laid an additional covering of tar and gravel, to afford protection from flying molten slag which is occasionally thrown by explosions while being poured into the water. It is imperative that the roof be well protected as any leakage will cause corrosion to set in very rapidly,

* Continued from issue of June 16.

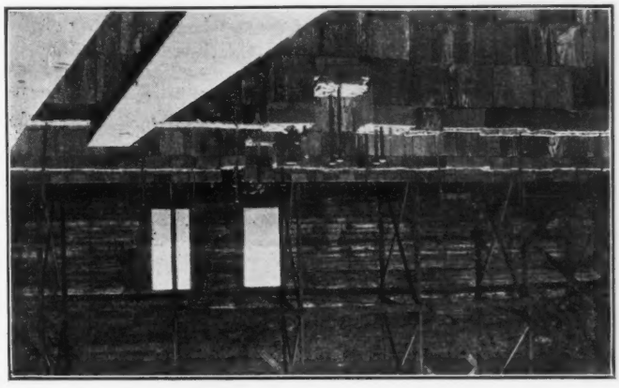
structure. It is a peculiarity of these gases that they will have no effect on steel so long as they are kept perfectly dry, but with the addition of a very small quantity of water, even in the form of steam, they will cause it to corrode quite rapidly. The roof is carried on wood purlins spaced about two feet centers. Most of the purlins first served as studing for the forms, and for wind bracing.

To return again to the foundations. The only excavating that was done was for the piers of the pilasters. This was carried to depth of but twelve inches, as there was no occasion for going deeper in order to secure more solid foundation. It will be recalled that the ground consists of slag placed while molten so that no better condition would result by excavating six feet than one foot. The only object in going below the surface at all was to take advantage of the brace against any lateral movement which was afforded by the sides of the excavations. The walls between the pilasters were laid directly on the surface of the ground in order to secure a tight point. This is quite important as a leakage of air into the lower chamber would result in setting fire to the accumulated dust, and probably keep it burning constantly. The main pilasters were reinforced with four one-half inch bars spaced twevle inch centers, and bound together by hoops of three-eights round iron placed every eight inches vertically. The corner pilasters have five bars with the other dimensions the same as those of the intermediates. The pilasters in the center of the transverse walls—those which support the center lien of steel



INLET AND COMBUSTION FLUES.

due to the nature of the gasses on the inside of the columns—are three feet by eighteen inches, and the bars are spaced eleven inches by thirty inches centers, with the hoops twelve inches apart vertically. The small pilasters which were provided midway between the center of the



TILE LINING FOR COMBUSTION CHAMBER.

building and the main walls, for the purpose of stiffening only, were reinforced by four one-half inch bars spaced ten inches by twenty seven with the hoops twelve inches apart. The main walls were stiffened by one-quarter inch bars placed six inches between centers of the horizontal rods and eighteen inches between the verticals. The transverse walls were supplied with horizontal bars only, and they were placed every twelve inches. At the tops of the transverse walls one-half inch rods were placed vertically and allowed to project about fourteen inches above the tops. These rods were afterwards bent over into the floor slab, thus affording a substantial tie at the joints. They were spaced to suit the terra cotta nozzles. At the junction of the main walls and the floor slab, expanded metal about three feet wide was run entirey around the structure, and bent into the form of an angle, equal parts being in the wall and the slab. In addition to the expanded metal, extra bars were bent outward into the ledge that supported the floor, and carried on up into the main wall Additional bars were also provided horizontally. The floor slab was divided into rectangular space twenty one feet by fifteen feet. The fifteen foot dimension was determined by the transverse walls, and the longer dimension by beams running as continuous members the entire length of the building, and placed over the three pilasters in the transverse walls. These beams were made continuous by leaving a recess in the top of the walls so that the beams were formed at the same time that the slab was placed, thus making the slab and its beams one solid mass. The beams were additionally anchored by allowing the vertical bars of the walls to project up and be bent into the beams.

[To be Continued.]

A NEW OFFICE

It is announced by Mr. H. C. Parker, acting district manager on this coast for the Stanley G. I. Electric Manufacturing Company, Northern Electrical Manufacturing Company, Fort Wayne Electric Works, and the Sprague Electric Company, that their headquarters, after June 25th, will be on the fourth floor of the Atlas Building, 604 Mission street, San Francisco. The offices will be fitted up with temporary furniture until the arrival of a complete new equipment from the East. The Oakland office, which is located at 67-68 Blake Block, will be continued for a short while for the benefit of the local trade. The companies have returned, as near as possible, to the same locality as they occupied before the fire—in fact, their new offices are just around the corner on Mission street from where they were formerly located.

The JOURNAL of ELECTRICITY POWER AND GAS
WITH WHICH IS INCORPORATED
The Engineers' Architects' and Builders' News

Published Weekly by
The Journal of Electricity Publishing Company

Yearly subscription, $4.00. Single copies, 10 cts. Foreign subscription, $5.00
Subscriptions cannot be begun with back numbers
Manuscripts submitted must be accompanied by postage to insure return

Address all communications and make all remittances payable to the Journal of Electricity Publishing Company

Entry changed May 1, 1906, to "The Journal of Electricity, Power and Gas," with which is incorporated "The Engineers' Architects' and Builders' News."
Entered as second-class matter at the San Francisco Post Office, August 15, 1899.
Entered as "The Electrical Journal," July, 1895.
Entry changed to "The Journal of Electricity," September, 1895.

VOL. XVI JUNE 23, 1906 No. 12

EDITORIAL

THE BUILDINGS OF THE NEW SAN FRANCISCO

There are many experiments conducted both in and out of the laboratory which require for the proper determination of results a long series of observations to allow natural conditions to be fulfilled. In such instances the most elaborately equipped laboratory is no better than one of very meagre appointments, as long as in each case the necessary conditions exist and the required arrangements are available.

Careful examination on the part of the investigator during the period of the experiment is of vital importance. Above all, however, it is necessary for the observer to most minutely analyze all of the data obtained to the end that his conclusions shall be in conformity with the observations made, due consideration always being given to the exact conditions existing during the entire period of time covered by the experiment.

The conclusions drawn must be based upon the facts brought out by the experiment, and every truly scientific man discards everything else from consideration in arriving at the ultimate result. Each set of observations is given its proper weight, not a single one being either discarded, distorted or enlarged.

Without their consent or approval, the people of California, and particularly of San Francisco, have been recently made observers of one of the most conclusive experiments ever known in regard to buildings and building materials. It is manifestly a most serious error, however, to exclude from the data which the earthquake and fire placed at our disposal the conditions which have existed during the entire life of the city, although the occurrences of April 18th, and the days immediately following, have made available data which heretofore for the most part was impossible to obtain. Nor do we desire any further experiments of such a destructive character, but "it is a condition and not a theory which confronts us," and the conclusions which are to be drawn at the present time must be the true ones and based upon all the facts, and not even in the slightest degree modified in any respect to the end that either large or small personal interests shall be favored.

Considering rather the smaller damage by earthquake as compared with the much greater destruction by fire, it can be said that every type of building, from the class A steel frame to the smallest wooden structure, was practically uninjured in the earthquake, provided a good foundation in solid ground had been made an integral part of the structure. Upon the so-called filled ground, where many years ago sand or rock had been dumped into creek bottoms, basins or lagoons, the natural beds of which were mud, the movement of the ground was so great as to destroy even the best building unless a foundation required by the location had been constructed. Upon the most solid ground, where inferior foundations, upon which poorly constructed buildings had been erected, the earthquake was equally destructive.

If we will adapt our construction, however, to the conditions as they exist in the different parts of the city, it is of not great importance whether steel, reinforced concrete, brick or stone is used. In every case the foundations must be of the proper character, suitable to the particular piece of ground under consideration The construction above the foundations in turn must consist of good materials, the walls, frame braces, and all details of the complete building being so proportioned and interconnected as to make a solid and complete structure from the bed of the foundations to the flag pole. Manifestly, what may be required in San Francisco along this line is equally necessary in every large city of the world.

An early decision by the city authorities in regard to the new building requirements along the broadest lines allowable under the circumstances is at the present time of the greatest importance to the future new and greater San Francisco.

PERSONALS.

Mr. Howard G. Aylsworth has arranged for the entire second floor of No. 527 Mission Street, on which site a permanent building is to be erected. Mr. Aylsworth will retain all of his former agencies, and expects to share in the general prosperity which is visiting the electrical trade in San Francisco.

Mr. S. W. Oliver, representing the Mechanical Appliance Company, Milwaukee, has been in San Francisco for the past two weeks viewing the ruins and making plans for the big business in sight.

Dr. Schuyler Skaats Wheeler, president of the Crocker-Wheeler Company, Ampere, N. J., sailed June 14th, on the Lloyd steamship "Barbarossa," for a short European trip. He was accompanied by Prof. Francis B. Crocker, Professor of electrical engineering at Columbia University, who has been associated with him in business for many years.

Palo Alto, Cal.—Contract for the additional electrical equipment for the municipal plant in this town has been placed with the National Brake and Electric Company, of Milwaukee, Wis. The contract calls for three alternating current generators and exciters, switchboards, induction motors, transformers, etc.

Book Reviews.

PRELIMINARY REPORT OF THE STATE EARTHQUAKE INVESTIGATION COMMISSION

The preliminary report of the State Earthquake Investigation Commission, appointed by Governor Geo. C. Pardee, on April 21st, has been printed in pamphlet form, and it was transmitted to the Governor on May 31st.

The Commission consists of Prof. A. C. Lawmson, Professor of Geology of the State University at Berkeley; Professor G. K. Gilbert, of the U. S. Geological Survey; Professor Fielding Reed, Professor of Geology of John Hopkins University, Baltimore; Professor J. C. Branner, Professor of Geology of Stanford University; Professor A. O. Leuschner, Professor of Astronomy of the State University in Berkeley; Professor Geo. Davidson, of San Francisco; Professor Chas. Burkhalter, Director of the Chabot Observatory, of Oakland, and Professor Wm. Wallace Campbell, Director of the Lick Observatory. The Commission met for the purpose of organization on April 24th, and elected Professor Lawson Chairman and Professor Leuschner secretary. The scope of the work of the Commission, as stated in the report covers three distinct heads, as follows:

1—The location of fault scarps and other deformations of the surface of the ground or sea bottom in the region affected.

2—The collection of time records leading to the construction of coseismal curves.

3—The collection of intensity records and their classification in a graded scale leading to the construction of isoseismal curves.

The result of the preliminary work are of great value, although the final report will naturally be of the greatest value.

The preliminary results, however, as stated in the report, are s follows, and we reproduce them here because of their great interest at the present time:

One of the remarkable features of the Coast Ranges of California is a line of peculiar geomorphic expression which extends obliquely across the entire width of the mountainous belt from Mendocino County to Riverside County. The peculiarity of the surface features along this line is the fact that they are not due, as nearly all the other features of the mountains are, to atmoshperic and stream erosion of the uplifted mass which constitutes the mountains but have been formed by dislocation of the earth's crust, or rather a series of such dislocations, in time past, with a differential movement of the parts on either side of the plane of rupture. In general this line follows a system of long narrow valleys, or where it passes through wide valleys it lies close to the base of the confining hills, and these have a very straight trend; in some places, however, it passes over mountain ridges, usually, at the divide sepearating the ends of two valleys; it even in some cases goes over a spur or shoulder of a mountain. Along this line are very commonly found abrupt changes in the normal slope of the valley sides giving rise to what are technically known as scarps. These scarps have the appearance of low precipitous walls which have been usually softened and rounded somewhat by the action of the weather. Small basins or ponds, many having no outlet, and some containing saline water, are of fairly frequent occurence and they usually lie at the base of the small scarps. Trough-like depressions also occur bounded on both sides by scarps. These troughs and basins can only be explained as due to an actual subsidence of the ground, or to an uplift of the ground on one side or the other, or on both sides. The scarps similarly can only be ascribed to a rupture of the earth with a relative vertical displacement along the rupture plane. Frequently small knolls or sharp litle ridges are found to characterize this line and these are bounded on one side by a softened scarp and separated from the normal slope fo the valley side by a line of depression. In many cases these features have been so modified and toned down by atmospheric attack that only the expert eye can recognize their abnormal character; but where their line traverses the more desert part of the Coast Range, as for example in the Carissa Plains, they are well known to the people of the country and the aggregate of the features is commonly referred to as the "earthquake crack."

This line begins on the north at the mouth of Alder Creek near Point Arena and extends southeasterly nearly parallel with the coast line to a point about two miles below Fort Ross, a distance of forty-three miles. Here it passes outside of the shore line and is again met with at the point where Bodega Head joins the mainland. Thence it appears to continue southward through Tomales Bay and Bolinas Lagoon. Beyond Bolinas Lagoon it passes outside of the Golden Gate and enters the shore again at Mussel Rock, eight miles south of the Cliff House. From this point it is traceable continuously along the valley line occupied by San Andreas and Crystal Springs Lakes, past Woodside and Portola, over a saddle back of Black Mountain, thence along Stevens Creek Canon, passing to the southwest of Table Mountain and Congress Springs to the vicinity of Wrights, on the narrow-guage railway between San Jose and Santa Cruz. From Wrights it continues on in the same course through the Santa Cruz mountains to the point where the Southern Pacific Railway crosses the Pajaro River near Chittenden. From the crossing of the Pajaro the line extends up the valley of the San Benito River, across the eastern portion of Monterey County, and thence follows the northeastern side of the valley of the San Jaun River and the Carissa Plains to the vicinity of Mount Pinos, in Ventura County. The line thus traced from Point Arena to Mount Pinos has a length of 375 miles, is remarkably straight, and cuts obliquely across the entire breadth of the Coast Ranges. To the south of Mount Pinos the line either bends to the eastward following the general curvature of the ranges or is paralleled by a similar line offset from it en echelon; for similar features are reported at the Tejon Pass and tracable thence though less continuously across the Mojave Desert to Cajon Pass and beyond this to San Jacinto and the southeast border of the Colorado Desert. The probablilty is that there are two such lines, and that the main line traced from Point Arena to Mount Pinos is continued with the same general straigth trend past San Fernando and along the base of the remarkably even fault scarp at the foot of which lies Lake Elsinore. But leaving the southern extension of the line out of consideration as somewhat debatable, we have a very remarkable physiographic line extending from Point Arena to Mount Pinos which affords every evidence of having been in past time a rift, or line of dislocation, of the earth's crust and of recurrent differential movement along the plane of rupture. The movements which have taken place along this line extend far back into the Quaternary period, as indicated by the major, well degraded fault scarps and their associated valleys; but they have also occured in quite recent times, as is indicated by the minor and still undergraded scarps. Probably every movement on this line produced an earthquake, the severity of which was proportionate to the amount of movement.

The cause of these movements in general terms is that stresses are generated in the earth's crust which accumulate till they exceed the strength of the rocks composing the crust and they find a relief in a sudden rupture. This establishes the plane of dislocation in the first instance, and in future movements the stresses have only to accumulate to the point of overcoming the friction on that plane and any cementation that may have been effected in the intervals between movements.

The earthquake of the 18th of April, 1906, was due to one of these movements. The extent of the rift upon which the movement of that date took place is at the time of writing not fully known. It is, however, known from

direct field observations that it extends certainly from the mouth of Alder Creek near Point Arena to the vicinity of San Juan in San Benito County, a distance of about 185 miles. The destruction at Petrolia and Frendale in Humbolt County indicates that the movement on the rift extended at least as far as Cape Mendocino, though whether the line of rift lies inland or off shore in that region is still a matter of inquiry. Adding the inferred extension of the movement to its observed extent gives us a total length of about three hundred miles. The general trend of this line is about N. 35° W., but in Sonoma and Mendocino counties it appears to have a slight concavity to the northeast, and if this curvature be maintained in its path beneath the waters of the Pacific it would pass very close to and possibly inside of Capes Gordo and Mendocino. Along the 185 miles of this rift where movement has actually been observed the displacement has been chiefly horizontal on a nearly vertical plane and the country to the southwest of the rift has moved northwesterly relatively to the country on the northeast of the rift. By this it is not intended to imply that the northeast side was passive and the southwest side active in the movement. Most probably the two sides moved in opposite directions. The evidence of the rupture and of the differential movement along the line of rift is very clear and unequivocal The surface soil presents a continuous furrow generally several feet wide with transverse cracks, which show very plainly the effort of tortion within the zone of the movement. All fences, roads, stream courses, pipe lines, dams, conduits, and property lines which cross the rift are dislocated. The amount of dislocation varies. In several instances observed it does not exceed six feet. A more common measurement is eight to ten feet. In some cases as much as fifteen or sixteen feet of horizontal displacement has been observed, while in one case a roadway was found to have been differentially moved twenty feet. Probably the mean value for the amount of horizontal displacement long the rift line is about ten feet and the variations from this are due to local causes such as drag of the mantle of soil upon the rocks, or the excessive movement of soft incoherent deposits. Besides this general horizontal displacement of about ten feet there is observable in Sonoma and Mendocino Counties a differential vertical movement not exceeding four feet, so far as at present known, whereby the southwest side of the rift was raised relatively to the northeast side, so as to present a low scarp facing the northeast. This vertical movement diminishes to the southeast along the rift line and in San Mateo County is scarcely if at all observable. Still further south there are suggestions that this movement may have been in the reverse direction, but this needs further field study.

As a consequence of the movement it is probable that the latitudes and longitudes of all points in the Coast Ranges have been permanently changed a few feet, and that the stations occupied by the Coast and Geodetic Survey in their triangulation work have been changed in position. It is hoped that a reoccupation of some of these stations by the Coast and Geodetic Survey may contribute data to the final estimate of the amount of movement.

The great length of the rift upon which movement has occurred makes this earthquake unique. Such length implies great depth of rupture, and the study of the question of depth will, it is believed, contribute much to current geophysical conceptions.

The time of the beginning of the earthquake as recorded in the Observatory at Berkeley was 5 hours, 12 minutes and 6 seconds a. m., Pacific Standard time. The end of the shock was 5 hours, 13 minutes and 11 seconds a. m., the duration being 1 minute and 5 seconds. Within an hour of the main shock twelve minor shocks were observed by Mr S Albrecht of the Observatory and their time accurately noted. Before 6:52 p. m. of the same day thirty-one shocks were noted in addition to the main disturbance. These minor shocks continued for many days after April 18, and in this respect the earthquake accords in behaviour with other notable earthquakes in the past. The minor shocks which succeed the main one are interpreted generally as due to subordinate adjustments of the earth's crust in the tendency to reach equilibrim after the chief movement.

The collection of time records necessarily proceeds slowly. The purpose of the coseismal curves based upon these records is in general two fold. In ordinary earthquakes it is one of the means of locating the seat of the disturbance when there is no surface manifestations of the rupture in the earth's crust. In the present instance, however, the rupture has declared itself in an unmistakable rift observable on the surface, and coseismals are therefore unnecessary for the determination of this important factor in the general problem, so far at least as regards the main disturbance. It is probable, however, that so radical a change in the equilibrium of the stresses of the earth's crust would induce secondary ruptures and consequently secondary earthquakes closely associated with the chief shock. The careful plottings of the time records, may, therefore, be useful in revealing the location of these secondary disturbances, such for example as the one which affected Southern California on the afternoon of the 18th of April. The second purpose of securing time records is the determination of the velocity of propagation of the earth wave; and the data for this which are likely to be most servicable are the records obtained at various quite distant seismographic stations.

The destructive effects of the earthquake are in the main distributed with reference to the line of rift. The exact limits of the area of destruction have not yet been mapped, but it is known to extend out about 25 or possibly 30 miles on either side of the rift. On the southwest side the greater part of this area to the north of the Golden Gate lies in the Pacific. This area extends from Eureka in Humboldt County to the southern extremity of Fresno County, a distance of about four hundred miles.

Beyond this area of destructive shock the earthquake was felt in its milder manifestations over a wide territory. Our reports to date show that it was felt in Oregon as far north as Coos bay, and on the south as far as Los Angeles. To the east it was felt over the greater part of middle California and eastern Nevada, particularly along the eastern flank of the Sierra Nevada. It was felt at Lovelocks, and we have unconfirmed reports of its having been felt at Winnemucca. Far beyond the region within which it was apparent to the senses, however, the earth wave was propagated both through the earth and around its periphery; and some of the most valuable and most accurate records of the disturbance which we have are those which were registered at such distant seismographic stations as Washington, D. C., Sitka, Alaska; Potsdam, Germany; and Tokyo, Japan.

Within the area of destructive effects approximately 400 by 50 miles in extent the intensity varied greatly. There was maximum immediately on the rift line. Water pipes, conduits, and bridges crossing this line were rent asunder. Trees were uprooted and thrown to the ground in large numbers. Some trees were snapped off, leaving their stumps standing, and others were split from the roots up. Buildings and other srtuctures were in general violently thrown and otherwise wrecked, though some escaped with silght damage. Fissures opened in the earth and closed again, and in one case reported a cow was engulfed. A second line of maximum destruction lies along the floor of the valley system of which the Bay of San Francisco is the most notable feature, and particularly in the Santa Rosa and Santa Clara valleys. Santa Rosa, situated twenty miles from the rift, was the most severly shaken town in the State and suffered the greatest disaster relatively to its population and extent. Healdsburg suffered to a nearly similar degree.

San Jose, situated thirteen miles, and Agnews, about twelve miles from the rift, are next in the order of severity. Stanford University, seven miles from the rift, is probably to be placed in the same category. All of these places are situated on the valley floor and are underlain to a considerable depth by loose or but slightly coherent geological formations, and their position strongly suggests that the earth waves as propagated by such formations are much more destructive than the waves which are propagated by the firmer and highly elastic rocks of the adjoining hill lands. This suggestion is supported by a consideration of the destructive effects exhibited by towns and single buildings along the same valley line which are situated wholly or partly on rock. Petaluma and San Rafael, though nearer the rift than Santa Rosa, suffered notably less, and they are for the most part on, or close to, the rocky surface. The portions of Berkeley and Oakland which are situated on the alluvial slope suffered more than the foot hills, where the buildings are founded on rock. The same suggestion is further supported from a consideration of the zone of maximum destructive effect on the southwest side of the rift. This zone lies in the Salinas Valley. The intensity of destructive action at Salinas was about the same as at San Jose, and the town is situated on the flood plain deposits of the Salinas River. Along the banks of the Salinas River and extending from Salinas to the vicintiy of Gonzales, so far as our reports at present show, the bottom lands were more severely ruptured, fissured and otherwise deformed than in any other portion of the State. The Spreckels Sugar Mill, situated on the banks of the river, suffered more severely probably than any other steel structure in the State. Santa Cruz, on the other hand, which is on the same side of the rift, and at the same distance from it, but which is built on rock for the most part, suffered much less damage. In the northern counties along the coast the most severe effects were felt at Ferndale, on the south margin of the flood plain of the Eel River, and at Petrolia, on the bottom land of the Mattole. Fort Bragg was severely shaken with very destructive effects, but our reports do not yet indicate the character of the ground upon which it is situated.

In the facts which have been cited we seem to have warrant for a generalization as to the excessively destructive effect of the earth wave as transmitted by the little coherent formations of the valley bottoms. But it must be borne in mind that by far the greater number of structures subject to destructive shock are situated in the valley lands and that there has not yet been time for a detailed comparison of the effects in the valleys with those in the hills, where the buildings are founded on firm rock except in a few notable instances.

The most instructive of these instances is the city of San Francisco, and the facts observed there are entirely in harmony with the generalization outlined. In the city of San Francisco we may recognize for preliminary purposes four types of ground: (1) The rocky hill slopes; (2) the valleys between the spurs of the hills which have been filled in slowly by natural processes; (3) the sand dunes; (4) the artificially filled land on the fringe of the city. Throughout the city we have a graded scale of intensity of destructive effects which corresponds closely to this classification of the ground. The most violent destruction of buildings as everybody knows, was on the made ground. This ground seems to have behaved during the earthquake very much in the same way as jelly in a bowl, or as semi-liquid material in a tank. The earth waves which pass through the highly elastic rocks swiftly with a small amplitude seem in this material to have been transformed into slow undulations of great amplitude which were excessively destructive. The filled in material and the swampy foundation upon which it rests behaved, in other words, as a mass superimposed upon the earth's surface, rather than as a part of the elastic crust itself. In a less degree the same thing is true of the sand dune areas, where the ground was frequently deformed and fissured. In still less degree the naturally filled valleys between the hill spurs were susceptible to this kind of movement, and the destruction of buildings was correspondingly less, but still severe, depending very largely on the character of the buildings, the integrity of their construction, etc. In portions of these valleys, however, the original surface of the ground has been modified by grading and filling, and on the filled areas the destruction was more thorough than elsewhere in the same valley tracts. On the rocky slopes and ridge tops, where, for the most part, the vibration communicated to buildings was that of the elastic underlying rocks, the destruction was at a minimum. On some of the hills chimneys fell very generally and walls were cracked; on others even the chimneys withstood the shock.

While this correlation of intensity of destructive effect appears to hold as a generlization, there are well known exceptions which find their explanation in the strength of the structures.

Modern class A steel structures with deep foundations appear to have been relatively passive, while the made ground in their vicinity was profoundly disturbed. Thoroughly bonded and well cemented brick structures, on similarly deep and solid foundations, seem to have been equally competent to withstand the shock, except for occasional pier-like walls not well tied to the rest of the building. The weak points in wooden frame structures were in general in the faulty underpining and lack of bracing, and chimneys entirely unadapted to resist such shocks. With these faults corrected, frame buildings of honest construction would suffer little damage beyond cracking of plaster in such a shock as the 18th of April, save on the made ground, where deep foundations and large mass appear to be essential for the necessary degree of passivity.

Pipe lines and bridges crossing the rift line presents a peculiar, if not quite unique, engineering problem which will doubtless be solved in the near future. Pipe lines on low swampy ground or in made ground are in much greater danger of destruction from earthquake shocks than those on high ground underlaid by rock, except in the immediate vicinity of the rift, where nothing could be constructed which would withstand the violence of the earth movement.

Report of the Electric Railway Test Commission to the President of the Louisiana Purchase Exposition. 621 pp. illustrated. Published by the McGraw Publishing Co., New York. Price $4.00.

A full account of a series of service tests of electric railway equipments, conducted by men of the highest rank as electrical engineers, and embodies results of the greatest value, and not available in any other form.

The Principles of Electric Wave Telegraphy, by J. A. Fleming, M. A., D. Sc., F. R. S., etc. Illustrated. 671 pp. Longmans, Green & Co., London and New York. Price $6.00.

A masterly work going into the details of theory and practice of wireless telegraphy.

It gives a careful analysis of the scientific phenomena, and detailed descriptions of the appliances and methods which are involved.

Far and away the best book on the subject published to date.

Number 2 of the "Journal of Engineering," of the University of Colorado, 1905-6, contains a number of interesting articles, among which are the following: "Span and Dip Tables," by H. E. Wagner; "Hydro-Electric Plant of the Animas Power and Water Co.," by H. D. Dwight; "The Design of Retaining Walls," by Prof. M. S. Ketchum; "The Design of Direct Current Electrical Installations for Industrial Plants," by F. A. Wardenburg.

"The Electrical Journal" for June reproduces an article from the pen of Mr. H. W. Buck, Electrical Engineer of the Niagara Falls Power Co., which appeared in the "Outlook" of May 19th. There is also reproduced an editorial from the "Outlook" of the

same date. These two statements of "The Æsthetic versus the Economic Value of Niagara Falls" are extremely interesting. Another article in this issue is by J. N. Dodd upon "Mechanical Aids to Commutation," and is an unusually complete exposition of this important matter in connection with direct current apparatus.

Trade Catalogues.

Catalogue No. 11 of the Bryant Zinc Co., 158 West Van Buren St., Chicago, comprising their full line of battery supplies and material, also railway supplies and specialties used in the construction and maintenance of highway crossing signals.

Allis-Chalmers Company—Bulletin No. 1504, Allis-Chalmers Steam Turbines and Generators. This bulletin is one of the most important recently issued by the Allis-Chalmers Company and deals in a thorough manner, with the aid of many admirable illustrations, with the Parsons type of Steam Turbine which they manufacture. This bulletin should be in the hands of every engineer.

"Hornsby-Akroyd" Oil Engines—The De La Vergne Machine Company of New York has just issued a new 82 page catalogue describing the mode of operation of the "Hornsby-Akroyd" oil engine and giving illustrations and short descriptions of the more recent installations of these engines.

Bulletins Nos. 1 to 10 inclusive from the Association of American Portland Cement Manufacturers of Philadelphia contain complete information regarding the cement and concrete industry in its relations to the construction of buildings and concrete work in general. Each bulletin consists of an article in full by a competent authority on the subject, and the set is quite valuable to anyone interested in cement and concrete work in general.

The Electric Storage Battery Company's bulletin for May contains a rather complete description of the storage battery equipment of the elevated roads of Chicago, accompanied with maps of the extent of this system.

DECKER ELECTRICAL COMPANY.

The Decker Electrical Company, dealers in electrical supplies and contracting engineers, enters the electrical engineering field under most favorable conditions. A new building has been erected for them at 157 Minna street, between New Montgomery and Third streets, San Francisco. They will occupy this entirely, including the basement, main floor and two mezzarnes floors, and have already stocked up on several lines of electrical supplies, besides having large shipments enroute from the east. Their engineering and contracting departments will make a specialty of light, power, bell and telephone systems. The officers of the company are as follows: P. Decker, president and manager; P. Murman, secretary and treasurer; M. D. Long, superintendent of construction; Edgar D. Hand, engineer Wm. Decker and Mr. Decker and Mr. Hand were formerly of Decker Fagan Company.

THE GENERAL ELECTRIC COMPANY

The General Electric Company have removed the San Francisco office from 1759 Geary street to the Union Trust Building. They will retain ,however, their general executive offices at Union Savings Bank Building, Oakland, until such time as they can find adequate accommodations for their large office force. They have already out grown their Oakland offices, owing to increase in their force made necessary by the large amount of extra business since the fire. This has necessitated the removal of their supply department and engineering department to their warehouse at Emeryville. This factory is situated one block from the Hollis Street station on the Key Route.

The Pacific Coast office of the general Electric Company report very large business, having received and distributed no less than one hundred and three car loads of electrical goods and other machinery since the fire to date.

Industrial.

WOODEN & LITTLE

Wooden & Little have just erected a large warehouse and store at 534 and 536 Mission street, between First and Second streets, San Francisco, where they will have a complete stock of pumps for all purposes—for electric motors, gasoline engines, horsepowers, hand, windmill, and for every conceivable use. It is their intention to carry as complete a stock of pumps as heretofore. In addition to pumps, th y will carry a full line of pipe, pipe fittings, brass goods, wind mills, horsepowers, tanks and everything connected with irrigation work and will be able to fill orders almost immediately upon going into their new quarters, which will be about July 1st.

THE MECHANICAL APPLIANCE COMPANY

The Mechanical Appliance Company, whose factory and main office are in Milwaukee, Wis., represented in San Francisco by the Standard Electrical Works, make a specialty of small direct current motors and generators, varying in size for the motors from one-eight to five horsepower and dynamos from one-tenth to five kilowatts. These motors and dynamos are multi-polar and are made both slow speed and medium speed. They are particularly adapted for driving individual machines, such as printing presses, machine tools, cranes, linotypes and similar devices. The motos are made to operate both horizontal and vertical, and are constructed with back gears for very slow speeds, and may also be equipped with a magnetic clutch

A. S. KEELER & CO., INC.

This enterprising concern has recently added several important lines to their already large list of Eastern specialties for which they act as Pacific Coast agents. These additions include the Owen-Walsh Manufacturing Company, electrical fixtures; Premier Electric Company, switchboards and receiver cords; H. W. McCandless and Company, minature lamps; and Adamant Porcelain Company, porcelain tubes, knobs and cleats.

A. S. Keeler and Company have opened a branch office in Los Angeles at 206 North Los Angeles street; also an office in Seattle.

ALLIS-CHALMERS COMPANY.

This Company have removed their Pacific Coast offices to the Atlas Building, 602 Mission street, San Francisco and have discontinued entirely their Oakland office. Their Seattle office is now located at 316 Occidental Avenue.

The Allis-Chalmers Company have just closed a very large contract with the Bullychop Mining Company of Trinity County, California, for a complete Hydraulic Electric Transmission and Mining Equipment, comprising a twenty stamp mill motors, 450 kilowatt generators, water wheels and a transmission line of three and one-half miles in length. This plant is to be completed and turned over and in working order on or before November 25th, 1906.

THE ABNER DOBLE COMPANY

The Abner Doble Company announces that it has relocated at its former site, Fremont and Howard streets, San Francisco. The Company is one of the first to resume operations in the burned district, and has taken contracts for a large amount of work in addition to the orders on hand previous to the fire. Work is progressing rapidly on the Company's new shops and warehouses in the Potrero district at Seventh and Hubbell streets. Temporary pattern and forge shops are already in operation on the new site.

Home and Foreign News.

ILLUMINATING ENGINEERS SOCIETY

At a meeting of the Council of Illuminating Engineering Society, held in New York, on June 8, the following resolution was unanimously adopted:

1. In order to distribute as equitably as possible the benefits and privileges of membership in the Illuminating Engineering Society, the organization of Sections is authorized in any city or locality where the membership is at least fifty.

2. The membership of New York City and vicinity shall be organized as a section, to be known as the New York Section of the Illuminating Engineering Society.

3. Each section organized shall nominate and elect for the local conduct of the section, a Chairman, two Vice-Chairmen and a Secretary.

4. The expenses of Sections incurred for postal-card notices and stenographic report of discussions shall be paid from the general fund of the Society. Other expenses than these, such as rent of auditorium, if any, must first be authorized by the council.

5. In order to insure that the conduct of Sections shall always be in conformity with the general policy of the Society, any proposed action of a section not relating to the holding of meetings and the discussion of papers, shall be submitted to the Council of the Society for approval prior to being put into execution.

6. In order to facilitate the prompt issue of the Transactions, the meetings of all the Sections shall be held before the 20th of the month.

7. The Secretary of each Section shall distribute the stenographic reports of discussions to members of the sections for correction, and forward the corrected report to the General Secretary of the Society.

8. The Sections shall abide by the Constitution of the Society and conform to the regulations of the Council.

The enrolled membership of the Society on June 8 was 572.

ELECTRIC ELEVATORS IN LONDON

Six Penrose speed electric passenger lifts, claimed to be the fastest in Europe, and for that matter in any country, have just been placed in the Gamage building, Holburn Circus, London. In conjunction with apid running there is a total absence of jar, making it difficult to believe the speed actually attained. Change from a high to a low speed can also be made at any moment without delay. The mechanical arrangements are of the simplest character and occupy remarkably little space, and at the same time they are so complete that an accident is practically an impossibility.

Two of the lifts were recently on view. One is a "Safety Express" passenger lift, with six speeds ranging from 70 feet up to 450 feet per minute. The attendant slowly pushed over the handle of the controller, and the car travels slowly at first, then passes throuh five intervening speeds (at any of which the lift can be run if so desired), and eventually reaches its sixth or maximum speed of 450 feet per minute. This speed, it is said, can be reached within eight feet of travel, and when it arrives within a similar distance from the end of its journey the lift begins automatically to reduce its speed by an ingenious method, finally stopping after attaining its slowest speed. The equipment in the basement is driven by a 25 horsepower motor, which has been found necessary to attain the speed mentioned underload. The special brakes which come into operation in stopping the lift are automatically adjusted according to the load. The provision in the way of safety appliance is claimed to be such that, in the event of one of the four ropes merely stretching, the cage would immediately come to a standstill.

News Notes.

Merician, Idaho—It is proposed to construct an electric light plant at Meridian, to cost about $10,000.

Nelson, B. C.,—A company has been formed here with a capital of $1,500,000 for the purpose of furnishing light and power to Moyie and Cranbrook, where many mines are situated. Chas. Mackel, Nelson, promoter.

North Yakima, Wash.—The proposed city street railway company has been organized under the name of the Yakima Intervalley Traction Co.

Olympia, Wash.—A new building is to be constructed for the Sunset Telephone Company and an entire new outfit of switchboards, batteries, etc., throughout will be installed. Work commences at once.

Honolulu—One of the biggest deals in real estate and water rights ever consumated in Hawaii is reported to be near completion. It involves the sale of Pacific Heights and the water sources and rights belonging to the property. Also practically the whole of Panoa Valley and all the springs and water sources in that valley. It also involves the utilization of the water from these sources for water power and the etsablishment of a paper and fibre factory. Finally the plan contemplates an addition to the water supply of Honolulu without cost to the community. The promoter of the plans thus outlined is T. B. Reynolds, the representative in Hawaii of the New York Paper Export Association.

Long Beach, Cal.—L. M. Holt. representing a mallable steel manufacturing concern with a large plant in Indiana, east of Chicago, says that the company he represents is anxious to locate in Southern California and especially in Long Beach, where site is accessible by ship and railroad can be secured together. He told J. A. Miller, secretary of the Chamber of Commerce, that this steel company is desirous of securing 100 acres of land in the new harbor district as a site for this plant, which will mean an investment of nearly $1,000,000.

Portland, Or.—Construction was begun on the long discussed Front street electric railroad. It will be three and a half miles long, a double track, and will cost approximately $300,000. The road will be built by the Los Angeles Construction Company, of which M. H. French is president, and the work will be done under the direction of W. D. Larrabee and J. E. Taylor, executive engineres of the United Railways Company, and the city engineer.

Portland, Or —Wires and poles must be removed from business streets, and the ordinance requiring telegraph and telephone companies to remove them must no longer be pigeonholed in the committee-rooms of the City Council. This was the sentiment of the meetirg of the Initiative One Hundred at the Board of Trade rooms last evening J. Frank Watson and S. H. Freidlander spoke warmly on the subject and were heartily applauded. Mr. Watson said: "The open running of high-power wires is permitted in no other city, and Seattle, St. Paul and Minneapolis all compel electric companies to reduce their voltage before the wires enter the residence sections. This should be attended to in Portland. Men and horses have been killed within the corporate limits of Portland by accidently coming in contact with these power wires, and our authorities should show more interest in the lives and property of citizens than to permit this state of affairs to continue. The wires should be placed underground in order that firemen may not be handicapped in fighting fires. Our committee will demand that this life-saving ordinance be withdrawn from the pigeonhole where it has been placed by a committee of the City Council, and passed."

Corvallis, Or.—Another farmer's telephone line is building from the Big Elk County to Blodgett, a distance of 14 miles.

Spokane, Wash.—Charles M. Hurst of Portland, is in the city looking for a site to establish a plant for the manufacture of the Hurst Automatic Switch and Signal Company. The company is incorporated for $10,000,000.

Spokane, Wash.—T. J. Johnson, of the Marguerite Gold Mining Co., states his company is about ready to install a concentrator.

New Westminster, B. C.—The Stave Lake Power Co. is making rapid headway with the erection of the large power house on the Stave falls and will soon be ready to install the machinery. The plant is for the purpose of generating electricity for lighting and railway purpose.

Astoria, Or.—The city council granted F. H. Stowe a 35-year franchise for an automatic telephone.

Astoria, Or.—H. M. Thatcher, mgr. of the Pacific States Tel. Co., states his company will spend $20,000 in improvements this season.

Entiat, Wash.—Knapp & Farris are to build a telephone line from this place to Farris.

Seattle, Wash.—The Pasco Power & Water Co., capital stock $1,000,000; has been incorporated by Will H. Parry, W. J. Grambs, F. T. Blunck, H. K. Owens.

Grass Valley, Cal.—One of the largest water deals ever consummated in Northern California has been announced here. The entire holding of the Eureka Lake and Water Company have been taken over by E. J. McCutcheon of San Francisco, president of the Gaston Ridge Mine. He is a member of the law firm of Page McCutcheon and Knight. The Eureka Lake property is located in the northern part of this county, high among the Sierras. It is believed that W. B. Bourn, former president of the San Francisco Gas and Electric company, is the real buyer.

Vancouver, B. C.—New Machinery is being added to the plant of the Carmi mine, including a five stamp battery of 1,200 pounds each, a carload of appliances for cyanide plant, a centrifugal pump, overstone table and five amalgamating plates and a Tremain battery of two stamps.

Spokane, Wash.—A six drill air compressor will be installed on the property of the tar Company, near Mulland contolled by Finch and Campbell of this city.

Spokane, Wash.—The Ozark Mining and Milling Company will install a cynide plant on the Wild Rose property.

Oakland, Cal.—Articles of incorporation for four allied companies, three of which are to engage in the lighting and power business in Lodi, Auburn and Richmond and the surrounding regions respectively, have been filed with County Clerk Cook. The incorporators are the same in each company and are as follows: W. F. Russell C. A. Wilson and M. Brand, all of San Francisco, and H. A. Potter and F. A. Osborn, both of Oakland. The first corporation is called the Lodi Gas Improvement Company; the second the Auburn Gas Improvement Company, and the third the Richmond Gas Improvement Company. The capital stock of each of these companies is $100,000 and the number of shares 10,000, the incorporators individually having subscribed for one share of stock in each company. The principal place of business of each corporation is stated to be Oakland, but the boards of directors are empowered to meet in the cities for which the corporations are named. The fourth corporation is called the H. A. Potter Company, its capital stock is $25,000, of which $50 is subscribed, and it is to do a general construction business. Its place of business is Oakland.

Tacoma, Wash.—According to records filed with the County Auditor, the Tacoma Gas Light Company has mortgaged its entire plant and properties to the City Trust Company, of Boston, Mass., by the issuance of 20-year bonds bearing interest of 5 per cent per annum. The amount is $2.000,000, which, according to the papers filed, is to be used for extensive improvements.

Centraila, Wash.—A contract has been let by the Centralia Water Supply Company to the Roberts Manufacturing Company of Phildelphia, for a 500,000 gallon pressure filter and appurtenances.

Eugene, Or.—Emery C. Dye, of Oregon City, said to represent the Willamette Valley Traction Company has filed on five different power sites on the McKenzie River. The first one is about twenty-five miles east of Eugene and the one farthest up the river is forty-five miles from here. It is said that 80,000 horsepower can be developed at all of these sites combined. The water power will be used for the manufacture of electricity for the operation of an electric railway which is intended to be built up the McKenzie to the Blue River mines.

Portland, Or.—The Fairview Telephone Association has been incorporated by T. G. Barker, A. E. Bettys and Frank Teters; business, to build, equip and operate a telephone system between the towns of Coquille and Fairview, in Coos county; principal office Fairview; capital $1000.

Tacoma, Wash.—The plans of E. J. Felt, of the Pacific Traction, include a complete railway system in Tacoma, and his company is now building a line to American Lake, which is to be extended to Portland and Olympia. The Traction Compnany has already contracted for power, and there are already on the ground some 800 tons of rails. The American Lake Line is to be completed by August 1.

Ontario, Or.—The City Council has granted a ten years' franchise to the Idaho Light & Power Co., for an electric light system. The company will secure its power from the Payette River, in Idaho, and will also supply the towns of Weiser, Payette and New Plymouth, in Idaho, with light. The Ontario franchise calls for the completion of the system within one year, but President T. J. Snyder says he will have lights in Ontario within six months. This will make two electric light plants for Ontario.

Work has commenced on the $26,000 sewer system for Ontario, and it will be completed within 90 days. Barsdel & Co., of Butte, Mont., have the contract. Seymuor H. Bell is at present installing a water system here at a cost of $25,000. The water will be pumped from a well 283 feet deep, and a standpipe will be used.

Bellingham, Wash.—Two hydraulic plants will be installed in the Slate Creek district this summer, one for the Granite Creek Gold Mining Co, and the other on the McMillin-Berry placer beds on Canyon creek.

Boise, Idaho—A large concentrating plant is to be built at once at the Iron Dyke mine and a large smelter will be built at Nagle.

Baker City, Or.—Improvements are planned for the Matoon mine in the Pocahontas district, under the management of A. W. Butler. A 50-ton mill, with a new and improved crusher and amalgamator, are being installed. An electric lighting plant is to be installed at the mine.

Cottage Grove, Or.—Clarke & Hopkins, of Montana, will install new machinery at the Combination group on Martin creek.

Spokane, Wash.—A six drill air compressor will be installed and put in operation on the property of the Star Company at the head of Grouse gulch, near Mullan.

Portland, Or.—The first rails for the line of the Willamette Valley Traction Company are due. The initial shipment will consist of 2000 tons of steel, and this will be brought through Portland for delivery at Salem. The entire order is for 6000 tons, and the first delivery will complete one-third of the road. The work is to be carried on from the Salem end until the bridge over the Willamette at Butteville is finished, after which rails and other material will be hauled from Portland by water and the road completed into the city.

Spokane, Wash.—The Tyson Consolidated Gold Mining & Milling Company will spend $70,000 in improvements this season.

Wenatchee, Wash.—Assistant City Engineer Scott of Seattle will make estimates on the cost of a new system and pipe line for Wenatchee from Icicle creek, above Leavenworth. The proposed new pipe line from Icicle creek will be 30 miles long and the cost will approximate $200,000.

Los Angeles, Cal.—Active work was begun yesterday on the four-track line of the Pacific Electric Railway, beginning at Ninth and Tennessee streets, to be extended as far as the city limits at once and then to Watts Station, the junction of the Long Beach and Santa Ana lines, a distance of eight miles. Mr. Huntington has ordered the building of depots and switches along the remainder of the Long Beach line to its terminus stopped, until the survey for four tracks all the way has been completed, as it is his determination soon to give Long Beach a combination of local and express service that will require four tracks.

Conconnully, —Thomas Donan, superintendent of the Arlington Mining Corporation, will soon install a hoisting plant and six-inch drill compressor.

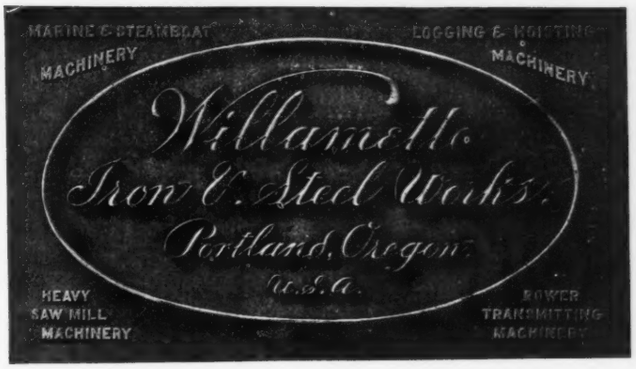
San Francisco, Cal.—The Pacific States Telephone Company is to erect a six story class "A" building on the site of its former building at 140 New Montgomery street. The frame is to be of the steel cage construction and the foundations and floors of reinforced concrete. The inner walls will be of fireproof material and the outside decorations will be of pressed brick, terra cotta and copper. Metal sashes are to be used for the wired-glass windows, which will be rendered doubly fireproof by rolling iron shutters. The whole building will be in Italian renaissance style. The cost is estimated at $300,000, and the time for construction at twelve months.

Santa Cruz, Cal.—The Ocean Shore Railroad was opened for regular traffic last week, as promised when construction work was commenced. Regular trains make daily trips to and from the cement work of San Vincente. The road will be in operation for the present only on weekdays.

San Francisco, Cal —The Committee on Electricity of the Board of Supervisors, at a recent meeting voted to recommend the amending of an ordinance by advancing the bond of persons engaged in placing or installing wires or other electric appliances in buildings from $500 to $2500. The bond is to insure a good character of work. The Committee on Licenses and Orders laid silently away in its tin box a petition of the Master Electricians that all persons engaged it that line of occupation be made to pay a license of $100 a quarter. The committee regarded this as a scheme of the Master Electricians to prevent journeymen opening little shops for themselves.

Portland, Or.—The contract for erecting the substation of the Portland General Electric Company, at Knott and Williams avenues has been awarded to Frieberg Bros. for $22,000.

Eugene, Or —Emery C. Dye, of Oregon City, said to represent either the Willamette Valley Traction Company or the United Railways Company, has filed on five different power sites on the McKenzie river; 80,000 horsepower can be developed at all of these sites combined.



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GOVERNMENT OWNERSHIP IN ITALY

The Italian ministry of posts and telegraphs contemplates appropriating all telephone lines now operated by private companies. It is proposed to indemnify the present owners by the payment of annuities up to the time of the expiration of their concessions. It is stated that the Italian Telephone Company and the Telegraph Company of Upper Italy have already declared their willingness to hand over to the State their lines, subject to the annuities offered being reasonable. This would place in the hands of the State twenty-four urban lines, including those of Rome, Naples, Florence, Venice, Genoa, Leghorn, Milan, Turin, and fifteen inter-urban lines.

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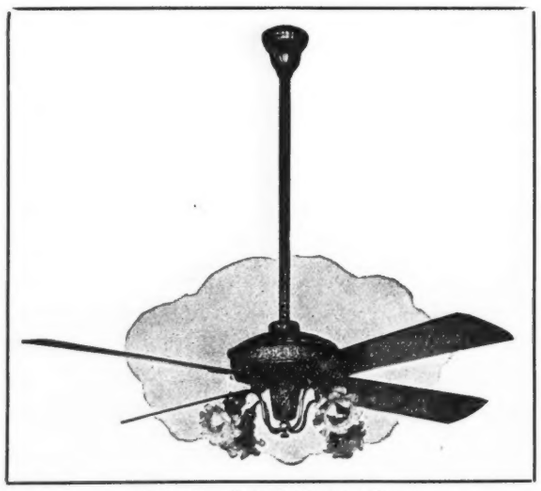

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Back Numbers of "The Journal."

If you have any and can spare same we would request that you forward them to our office, Atlas Building, 606 Mission Street, San Francisco. We have constant need of back issues of THE JOURNAL, and as our reserve copies (including our bound volumes) were entirely destroyed by the fire, we must depend upon the kindness of our friends in replacing same.

Notice to Subscribers.

We request each of our subscribers to send us his name and address and date of last payment; also copy of receipt therefor, in order that we may compare same with such of our records as were saved from the fire and avoid any possible errors or omissions. Also, all San Francisco subscribers should send us their new addresses in order to facilitate prompt delivery through the post-office.

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In a contest of speed and accuracy a score of famous telegraphers assembled in Boston recently to complete for trophies offered by the telegraph companies and the newspapers and by Andrew Carnegie, who has donated a handsome silver cup in memory of the days when he was a telegraph messenger in Pittsburg. Among the contestants are the speediest key operators of this country and Canada. The competitions will include contests in press work, in ordinary message work, in stock brokerage work and in railroad telegraphy.

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